

## **REMARKS**

### **I. Introduction**

In response to the Office Action dated June 27, 2007, Applicants have amended claim 7 in order to overcome the § 112 rejection. Support for the amendment to claim 7 may be found on pages 24-25 of the specification. No new matter has been added.

In response to the pending Office Action, Applicant respectfully submits that all pending claims are patentable over the cited prior art for the reasons set forth below.

### **II. The Rejection Of Claims 1-8 Under 35 U.S.C. § 103**

Claims 1, 2 and 5-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita et al. (USP No. 6,287,720) in view of Fujiwara et al. (USP No. 6,576,366); and claims 3-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita and Fujiwara and in further view of Shi et al. (US 2005/0014063). Applicants respectfully traverse these rejections for at least the following reasons.

With regard to the present invention, claim 1 recites a lithium secondary battery comprising: a positive electrode comprising a composite lithium oxide; a negative electrode comprising a material capable of absorbing and desorbing lithium; a separator interposed between said positive electrode and said negative electrode; and a non-aqueous electrolyte, wherein said separator comprises non-woven fabric, at least one of said positive electrode and said negative electrode has a porous film that is adhered to a surface thereof, and said porous film comprises an inorganic oxide filler and a binder.

It is admitted in the Office Action that Yamashita fails to disclose a separator comprised of non-woven fabric. Fujiwara is alleged to disclose a series of separator materials including

non-woven cloth (col. 9, lines 27-38). No other reference is made to the use of non-woven cloth, nor are advantages or disadvantages to using this cloth. The Office Action then concludes that it would have been obvious to one having ordinary skill in the art to use the non-woven cloth taught by Fujiwara for the separator of Yamashita because it is within the general skill of a worker to select a known material for the intended use as a matter of obvious design choice.

However, the non-woven cloth disclosed in Fujiwara and the porous film used as the separator in Yamashita are completely different materials in both structure and properties. As such, Applicants assert that it would not be obvious to substitute the porous film with the non-woven cloth of Fujiwara, as it would produce a battery with a totally different structure.

Furthermore, in the present invention, the non-woven fabric and the porous film are used in combination in order to overcome the negative characteristics of both materials. Typically, non-woven fabric is poor in mechanical strength. In addition, as discussed in paragraphs [0003]-[0004] of the specification, the problem with the porous film is that its porosity is usually low and its capability of retaining non-aqueous electrolyte is low. As a result, the internal resistance of the battery tends to rise and the electrodes become thicker due to expansion and contraction of the active materials during repeated charge and discharge of the battery. This leads to electrolyte depletion in the porous film because of the low electrolyte retention capability and a sufficient amount of non-aqueous electrolyte to the electrodes fails to be supplied. This results in a reduced capacity of the battery.

As such, even if one were to substitute the porous film of Yamashita with the non-woven cloth of Fujiwara, one would still not obtain the separator disclosed in claim 1 of the present invention, which combines a porous film with a non-woven fabric to provide a separator with

increased strength characteristics and reduced possibility of short-circuit. This is shown in the specification of the present invention in comparing Example 1 with Comparative Example 2. As is shown in Table 1, Example 1 has a porous film and a non-woven cloth separator.

Comparative Example 2 has only a porous film. Table 2 indicates that the battery of Example 1 has superior cycle characteristics (94% vs 90%), nail penetration safety and high temperature safety than the battery of Comparative Example 2. Accordingly, the use of both the porous film and the non-woven cloth in the separator exhibits superior and unexpected characteristics which are not disclosed or suggested in the cited prior art.

In order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA1974). As is clearly shown, Yamashita and Fujiwara do not disclose a lithium secondary battery comprising: a separator interposed between said positive electrode and said negative electrode; and a non-aqueous electrolyte, wherein said separator comprises non-woven fabric, at least one of said positive electrode and said negative electrode has a porous film that is adhered to a surface thereof, and said porous film comprises an inorganic oxide filler and a binder. Therefore, Applicants submit that Yamashita and Fujiwara do not render claim 1 of the present invention obvious and accordingly, Applicants respectfully request that the § 103(a) rejection of claim 1 be withdrawn.

**III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable**

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*,

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819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.


**IV. Conclusion**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication of which is respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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